Guideline

Title: Hypertonic Saline for Treatment of Pediatric Traumatic Brain Injury in the Emergency Department

1.0 SCOPE

1.1 Care of the Trauma Services patient at CCHMC.
1.2 This guideline provides the minimum standard of care for any patient with suspected or confirmed brain injury.

2.0 DEFINITIONS

2.1. **Hypertonic saline (HTS)**: 3% solution (concentration). HTS creates an osmotic gradient and draws water from the intracellular and extracellular spaces into the intravascular compartment, stimulates release of arterial natriuretic peptides and promotes cardiac output; may also inhibit leukocyte adhesion. Following severe traumatic brain injury (TBI) HTS is used to restore and maintain systemic and cerebral perfusion without increasing the ICP and exacerbating cerebral edema.
2.2. **Hypotension:** Defined as age appropriate parameters.
2.3. **Intracranial pressure (ICP)**: ICP is determined by the total force exerted by the brain, blood, and cerebrospinal fluid contained within the fixed volume of the skull. Elevated ICP, typically defined as > 20 mmHg, is a strong predictor of poor neurological outcome.
2.4. **Lateralizing signs**: Clinical signs of herniation such as dilated pupil, decerebrate or decorticate posturing, bradycardia, hypertension.
2.5. **Severe traumatic brain injury**: Glasgow Coma Score (GCS) 3 – 8.
2.6. **Tachycardia:** Defined as age appropriate parameters.

3.0 GUIDELINE

3.1. Criteria for administration of HTS in the emergency department who have one or more of the following::
- 3.1.1 GCS 3 – 8
- 3.1.2 Witnessed lateralizing signs

3.2. Administration:
- 3.2.1 Administration via femoral/central line is recommended but may be administered peripherally if no other access is available.
- 3.2.2 HTS bolus administration of 8 mL/kg over 15 minutes

3.3. If persistent hypotension: Repeat HTS bolus
3.4. If persistent hypotension following second HTS bolus: Administer PRBC 10 mL/kg per guidelines.
3.5. Consider foley placement in the ED if this does not delay transfer to CT or the PICU.
3.6. Refer to PICU guidelines for ongoing HTS administration in the PICU.

4.0 REFERENCES

4.1. Kochanek, PM, Carney, N, Adelson, PD, Ashwal, S, et al. (2012). Guidelines for the acute medical management of severe traumatic brain injury in infants, children, and adolescents, 2nd edition. *Pediatric Critical Care Medicine, 13*(1), supplement, s1-s82.
4.2. Pitfield, AF, Carroll, AB, & Kissoon, N. (2012). Emergency management of increased intracranial pressure. *Pediatric Emergency Care, 28*(2), 200-204.

5.0 APPROVALS

All revisions of this guideline are approved by the Trauma Service Department. This guideline is reviewed every three years or sooner if deemed necessary. Policy authority for this document resides with the Trauma Service Department. This guideline is approved by the Trauma Services Manager and the Director of Trauma Services.

HISTORY
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